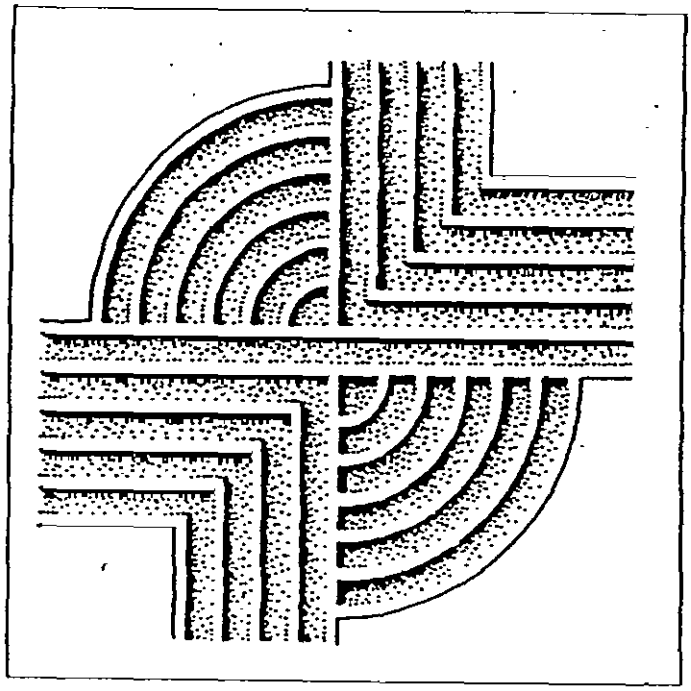
THE PRESERVATION OF ARCHAEOLOGICAL FIELD RECORDS IN THE SOUTHEAST: IS THERE A FUTURE FOR THE PAST?



RESEARCH CONTRIBUTION 28

THE PRESERVATION OF ARCHAEOLOGICAL FIELD RECORDS IN THE SOUTHEAST: IS THERE A FUTURE FOR THE PAST?

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Chicora Research Contribution 28

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Introduction

As archaeologists we frequently characterize the subjects of our study as non-renewable resources and we emphasize the importance of the "conservation" of the archaeological record, usually meaning archaeological sites. In addition, we acknowledge that all excavation, even properly conducted scientific investigations, destroys that archaeological record and requires extraordinary care in data recordation. There is even occasional mention made that the results of these excavations will be stored by a curatorial facility "in perpetuity." While there is considerable diversity of opinion among archaeologists about many topics and concerns, it is likely that most would agree that the results of archaeological studies should be "preserved for future researchers."

In addition, I believe that most archaeologists recognize the importance of their state site files as one of the major archaeological data banks. In many states thousands of sites have been recorded through surveys covering fifty or more years. These site files are often the first source consulted by archaeologists conducting both research and compliance studies. The files may represent an amazing accumulation of information about the cultural resources of a state.

In spite of these areas of basic agreement, archaeologists have been slow to recognize the need to preserve the results of their studies or the data base of state site location files. The 1976 Society of Professional Archaeologists Standards of Research Performance requires only that records be deposited at a curatorial facility and that care be taken with records to ensure contextual relationships not be obscured. It has been eight years since Curator (volume 23, number 1, 1980) published the 1979 Society of American Archaeology symposium papers on "The Curation of Archaeological Collections." A careful reading of these papers reveals a clear recognition that the curation of archaeological documentation is important and that it has received insufficient attention in the archaeological community.

Lindsay and Williams-Dean (1980:19-42) provided the first widely available account of the National Park Service's 1978 Curation of Collections Project (see also Lindsay et al. 1980). That study, which incorporated 20 institutions in 17 states found serious problems in the curation of archaeological remains. For example, only 35% of the institutions had conservation programs for the preservation of the artifactual remains, and only 20% consistently maintained adequate environmental conditions and had records to document temperature and humidity levels (Lindsay et

al. 1980:55-56). The report only briefly mentions the treatment of paper documentation, although the suggestion is that the treatment of this documentation is no better than the treatment of the actual artifacts (Lindsay et al. 1980:49-52).

Partially as a result of this study, the national Park Service has been developing 36CFR79, "Curation of Federally Owned and Administered Archaeological Collections." Although the proposed rule has not yet been enacted, it documents the growing concern in the profession for the adequate curation and preservation of archaeological research. The proposed rule, however, still emphasizes the curation of artifacts, rather than the curation of paper records and documents.

The reasons that curation studies and standards have emphasized the artifact, without giving equal consideration of the associated documents, are varied and may include our professional preoccupation with "artifacts," the general absence of archival or conservation training in graduate programs, the background and training of collections managers, and the very infrequent contact between archivists, conservators, and archaeologists. An exception is the recent publication of Preserving Field Records: Archival Techniques for Archaeologists and Anthropologists by the University of Pennsylvania (Kenworthy et al. 1985). This study provides a thorough overview of preservation principles and practices relating to paper records, photographic materials, and electronic data.

The purpose of Chicora's study is to examine the methods used by a number of major Southeastern repositories to curate field records, specifically paper and photographic materials. The techniques of curation revealed by the study are then evaluated for their effects on the stability and life expectancy of the records. The goal is to emphasize the importance of preserving the written and photographic documentation comprising site and excavation files. Just as the sites themselves are non-renewable resources, so too are the files which contain the primary notes and documentation relating to these sites. Archival storage methods and materials, which would guarantee the preservation of these irreplaceable documents, are discussed and the costs are addressed.

This study was confined to the Southeast, although the general conclusions and recommendations are certainly applicable to all other areas of the country. A detailed, six page questionnaire (Appendix 1) was sent to 17 institutions in 10 states. Sixteen institutions, representing all 10 states, responded. Nine of the institutions represent official state repositories of site form information. Institutions participating in this study include the S.C. Institute of Archaeology and Anthropology (University of South Carolina, Columbia), Office of Archaeological Research (University of

Alabama, Moundville), Laboratory of Archaeology (University of Georgia, Athens), Research Laboratories of Anthropology (University of North Carolina, Chapel Hill), Office of State Archaeology (Department of Cultural Resources, Raleigh), Historic Sites (Department of Cultural Resources, Raleigh), Florida State Museum (University of Florida, Gainesville), Division of Historic Resources (State of Florida, Tallahassee), Office of State Archaeology (University of Kentucky, Lexington), Museum of the University of Kentucky (Lexington), Department of Anthropology (Catholic University, Washington, D.C.), Museum of Geoscience (Louisiana State University, Baton Rouge), Tennessee Division of Archaeology (Nashville), Frank H. McClung Museum (University of Tennessee, Knoxville), Virginia Division of Historic Landmarks (Richmond), and an institution which requested anonymity.

The questionnaire was divided into four sections. The first dealt specifically with site forms and was primarily aimed at those institutions which serve as either the actual or de facto repository for this data. The second and third sections dealt with the curation of photographic materials (black and white and color transparencies). The fourth section dealt with the curation, storage, and preservation of all other paper records. These final three sections, of course, applied to all of the institutions. Questions within each section attempted to reveal how various items were stored, safe guarded, and used. The questionnaire requested actual samples of paper records, photocopies, and storage media for archival stability tests. The results of these questionnaires are discussed in a following section of this paper.

The Nature of Paper Records

In order to fully understand the reason that paper documents require special curatorial care it is necessary to understand the nature of these materials. As Ruwell notes,

> despite the care and diligence with which researchers collect their data, they are often recorded on highly impermanent media. In-attention to paper, film, or ink qualities, for instance, may lead to serious problems of deterioration over the years. Records, even those stored carefully, have become irretrievably damaged or barely salvageable because of the type and quality of material used (Ruwell 1985:3).

Common writing, printing, and photocopier papers may be said to have a relatively high degree of "inherent vice." That is, the manufacturing processes result in products that, regardless of their storage, are prone to rapid deterioration. While most people recognize that newsprint will remain usable for only 15 or 20 years, few archaeologists realize that common photocopier paper has a life expectancy of about 50 years. Cotton bond,

although frequently expensive and thought to be "long lasting," may actually have as short a life span as less-expensive papers.

The most significant enemies of paper include groundwood, low pH (or high acidity), and the presence of alum and alum-rosin size. Modern papermaking processes frequently use mechanically reduced wood fiber or "groundwood." This groundwood produces a weak paper that contains a high proportion of lignin. Lignin is a large complex organic molecule which easily breaks down to forms numerous acids and peroxides. After 1850 not only did the use of groundwood increase in paper production, but so too did alum-rosin sizing (which makes paper less absorbent). The rosin tends to oxidize, causing brittleness in the paper and alum is an acid salt which degrades to form sulfuric acid. It is clear that not only does acid find its way to paper through inks, atmospheric pollutants, and transfer from adjacent materials, but also as integral aspects of the manufacturing process. Extensive testing has revealed that acidity is one of the primary causes of paper deterioration. The acidity causes the hydrolysis of the cellulose molecules. As they break down the paper becomes weak, brittle, and stained (Clapp 1972; Ritzenthaler 1983; Van Houten 1985).

In addition to the "inherent vices" of paper, its storage will have a tremendous affect on its ability to survive. Major enemies of paper include both visible light (which fades and discolors) and UV light (which fades and causes photochemical reactions), heat (which increases chemical reactions), both high and low humidities (below 40% and above 60%), and biological agents (such as insects and fungus).

Paper can be said to vary in both permanence and durability. Permanence refers to the ability of a paper to remain chemically stable and resist deterioration, while durability refers to a paper's ability to retain its original physical strength and mechanical properties. The paper used in a telephone book needs to be durable, but need not be permanent. Paper used in reference books, however, must be both permanent and durable. Standards are available as ANSI Z39.48.1984. Typically, permanent paper, which has the ability to last at least 200 years, should have a minimum pH of 7.5, an alkaline reserve equal to a 2% calcium carbonate buffer, contain no groundwood or unbleached pulp, and meet certain requirements for tear resistance and folding endurance. It may also be useful to ensure that paper intended for archival copies be free of lignin. It is also worthy to mention that all "acid-free" material is not of archival quality, nor should any materials be accepted for use without independent testing (which is easily performed using several available test kits) (see Appendix 2 for suppliers).

In addition, when discussing the preservation of paper it is appropriate to also mention the use of different types of ink.

Very few commercially available inks offer archival permanence and ball point and felt-tip pens (being neither light nor water fast) should never be used on records of enduring importance. While permanent inks are available from archival supply companies, the least expensive archival choice for field notes is a pencil. Carbon typewriter ribbons yield permanent images, although the film ribbons used in many typewriters today do not provide a permanent image.

Paper should be stored in the dark and used in light which has been UV filtered. Exposure to sunlight should be avoided. The temperature of storage should be as low as possible, but certainly no higher than 75°F. Recent studies have shown that storing paper at 86°F will reduce its life expectancy to one forth that of storage at 68°F. Relative humidity should be controlled and contained to a range of 40-60% RH. Below 40% the paper becomes dry and brittle, above 60% inks can run, insects are more numerous, the risk of fungal attack is dramatically increased, and chemical reactions are speeded up. If some fluctuation in humidity is unavoidable, it should be as gradual as possible. Recent work by the Getty Conservation Institute suggests that paper is buffered from humidity variations by proper boxing. Paper should be stored in a building with an operational HVAC filtration system to reduce or eliminate gaseous and particulate pollution. Finally, paper documents should be stored in such a way to prevent acid migration, exposure to gaseous pollutants, and physical stress. Little is accomplished if the paper is of archival quality, but the records are stored in acidic commercial office folders, in oak filing cabinets which give off formaldehyde and other pollutants, and the papers are folded and bent because the folders are either too tightly or too loosely packed.

Another significant concern is the stability of various photocopying processes. It is clear that copies made by various photochemical or "wet" processes are inherently unstable. On the other hand various "dry" copying processes tend to be stable, <u>if</u> the machine is in proper working order. Unfortunately, often these machines are not.

A final concern with paper records involves the use of various tapes, staples, and clipping devices. Any form of pressure sensitive tape, including Scotch™, masking, and drafting tapes, should be avoided. If tape must be used, there are pressure sensitive document repair tapes available which are somewhat less damaging than commercial tapes. The best recourse, however, is isolation of damaged items and appropriate storage. Staples should generally be avoided since they not only damage the integrity of the paper, but rust in high humidity. The rusting process not only stains the paper, but also causes damage through chemical decomposition. If staples must be used, there are non-rusting stainless steel staples available. Likewise,

paper clips and other metal fasteners cause mechanical damage to the paper and may rust. Better choices are either plastic, brass, or stainless steel.

The Nature of Photographic Material

The photographic materials considered in this study include color transparencies, black and white negatives (largely polyester based, although some cellulose acetate negatives are included), and black and white prints (including both fiber and resin-coated papers).

Color transparencies are considered to have a very high level of inherent vice, which is to say that they are inherently unstable and cannot be considered archival. Regardless of the treatment they receive, they will have a definite useful lifespan. There are, however, certain differences in types of film used and there are ways to improve the life expectancy of slides.

In general, Kodachrome slides tend to have a longer useful life than Ektachrome slides, although Ektachrome slides tend to hold up better if the slides are intended only for projection (Keefe and Inch 1984:259-261). While other manufacturers, such as Fuji, may have slides with similar archival characteristics, little research has been done on any material other than Kodak's. It is therefore wise, if possible, to minimize the number of different brands of slides used.

Environmental storage conditions have a tremendous affect on the longevity of slides. The ideal storage is at temperatures of 0° and 10° F and a relative humidity of 25% to 30%; although clearly this is impractical for frequently used collections. Storage should be in total darkness at as low a temperature as possible (Eastman Kodak Company 1979; Ritzenthaler et al. 1984). There are a number of possible storage arrangements for slides, including metal cabinets and various plastic enclosures. In the case of metal cabinets they should be determined to be air and dust tight, and the paint should not off-gas damaging substances, such as formaldehyde. Plastic enclosures may be made of polyester, polypropylene, triacetate, or polyethylene. In no case should polyvinyl chloride (PVC) be used with any photographic material (see Appendix 3).

Black and white photographic materials can be processed for archival permanence and, as a result, are much more stable than either color transparencies or color prints. Such processing for permanence, however, requires care and attention beyond that usually given film in commercial laboratories. In addition, archival processing requires more than simply using a hypo-eliminator. Detailed instructions for permanent processing are offered by Eastman Kodak Company (1979) and Keefe and Inch

(1984). The processes involve strict control of chemical quality and mixtures, exact timing, close attention to temperatures, careful fixing using a two bath system, the use of a hypo-clearing agent, sufficient washing, toning (although recent work is questioning the usefulness of this step), and finally, routine testing to verify the archival permanence of the film. This testing may be accomplished through the use of several common test kits (see Appendix 2).

The processing of black and white prints is not substantively different from that of film. The fix should be ammonium thiosulfate at film strength, rather than the more common sodium thiosulfate, and no acid hardener should be used. The use of both a washing aid (such as Kodak Hypo Clearing Agent, Hustler, Orbit Bath, or Permawash) and a hypo eliminator (Kodak Hypo Eliminator HE-1) is necessary. Finally, periodic testing of both chemicals and the final prints is essential to ensure that the process has been successful. Resin-coated paper is not considered archival since the emulsion can lift from the underlying backing. Only fiber based papers are considered of archival quality.

The archival storage of black and white film requires temperatures of 50° to 60° F and a relative humidity of 30% to 45%, although storage at temperatures of up to 70° F and 50% RH is acceptable. Appendix 3 provides information on a number of storage media, including paper and plastic enclosures. Glassine envelopes should not be used since they are acidic, contain a volatile plasticizer, usually have a center seam, and use a hygroscopic glue. If paper envelopes are used they should be acid and lignin free, have side seams, and probably should not be buffered. Kraft paper envelopes should not be used. There are a number of plastic holders available, although polyvinyl chloride should not be used. Plastic enclosures should be used with care where humidity control is less than adequate since moisture can be trapped within the plastic housing and cause ferrotyping on the film.

The Study Results

State Site Forms

Nine of the 16 responding institutions represent the official repository of their state's site form files. These files provide primary information on sites: location, environmental conditions, temporal periods of occupations, collections, and so forth. Eight of the nine institutions were able to estimate their holdings, although one institution indicated that they had no idea of how many site forms were present in their collection. The eight states include a total of approximately 122,000 site forms, with a range from 2000 to 45,000 and an average of 15,250 forms. In only three cases are

duplicate copies of some type maintained elsewhere in the facility, although in five cases copies of site files are available elsewhere in the state. The importance of these observations is tremendous -- in several cases the state files have no backup what-so-ever, so that any disaster, such as a fire or flood, could wipe out the entire state's inventory. Only three institutions have made an attempt to duplicate site files and store them separate from the main files. One of the more notable cases is the State of Florida which has computerized their site files, instituting a hierarchy of backups.

Seven of the nine repositories store their paper site files in folders, while two use ring-binders. Only one institution in the nine is using any acid-free enclosures, and only a small proportion of their files are protected in this manner. Commercial office folders examined by this study (including Oxford Esselte R752, Globe-Weis 14, and Oxford Pendaflex) are uniformly acidic (<6.0 pH) and test positive for alum size. Groundwood, however, was not detected in the samples examined. Clearly these folders offer inadequate protection.

In five cases the institutions acknowledged that a variety of items were placed in the site form file. Inclusions such as newspaper articles may be highly acidic and permit migration of acid to other valuable documents.

Only three of the nine institutions had any requirement regarding the writing media used on site forms and these requirements were of limited value since they specified only the color of the ink (i.e., black or blue-black) or that the ink be "permanent." The remaining six institutions have no requirements at all.

Only two of the nine official repositories indicated that there was constant environmental control in the site form storage area, although neither institution maintained any records of that environmental control and neither institution had information on the typical humidity range. Among the seven institutions which claimed no real controls, temperature variations of at least 65° to 78° F and relative humidity variations of at least 45% to 75% were noted. Three institutions allow smoking in the site form area and six allow eating and drinking among the site forms records.

Only one institution has a policy for the regular inspection of the site forms to assess damage, deterioration, and loss of records. Another institution said that such inspections took place "irregularly," while the remaining seven institutions have no policy for inspections. None of the institution have developed any disaster plans to insure the protection of these irreplaceable records from natural and man-made disasters (although one institution has a disaster plan covering the

electronic media).

All nine states provided copies of their site forms for testing. Of these seven were offset printed and two were photocopied. One photocopied form failed to yield a stable image. Of the nine forms, seven tested positive for alum size and six yielded an acidic pH (‹6.0). Two site forms, used by the States of Georgia and Tennessee, were printed on acid-free, buffered paper, free of both groundwood and alum size. The site form for the State of Alabama yielded a pH ›6.7, but tested positive for alum size. As a result, only two site forms may be considered archival and capable of lasting several hundred years. The other forms would be expected to have life spans of about 50 years. In addition, several of the forms were multipages and staples were used to bind the pages together. In one case the form sent as a sample was already showing rust staining around the staple. One state uses both carbon and carbonless multicopy forms, although carbon and carbonless copies are not archivally stable.

Black and White Photographic Materials

A total of fifteen of the sixteen institutions responded that they housed black and white photographic collections from site surveys, their own excavations, or from projects conducted by archaeologists outside their institution. The most common storage media for black and white negatives are plastic pages (used by 10 institutions), although paper envelopes are used by five institutions, glassine envelopes are used by four, and mylar envelopes are used by one. Samples of the plastic pages revealed that all are archivally safe, although the glassine envelopes supplied tested acidic. Paper envelopes supplied included both Hollinger and Savage brands. The Savage brand contains groundwood, has a pH ‹6.0 (i.e., is acidic), and contains alum size. The Hollinger envelope was buffered and evidenced no alum or groundwood.

Processing was by commercial establishments at six of the fifteen institutions, by in-house photographers at five, by an archaeologist at one, and by various combinations at three additional institutions. Six institutions stated that their negatives were not processed to archival standards, six indicated that they did not know, and three said that archival standards were used. Among these three institutions, however, the concept of archival standards varied. One responded that Permawash was used and hence archival quality was obtained, another stated that their processing was done "to National Archives standards." The third did not know what archival processing was done, but was certain that their collections were archivally processed.

In cases where photographic materials are accepted for curation from outside researchers, 12 institutions indicated that they did not require the materials to meet any archival

standards. One institution did require archival processing, but required no documentation of processing methods and performed no spot checks for negative stability. Two institutions do not accept collections from outside researchers.

Eleven of the fifteen institutions routinely print all of their negatives, although none of the institutions print enlargements, only contact sheets are made. This limits the use of these prints to identifying negatives -- they could not be used as second generation originals if the negatives were lost or damaged. In addition, only one of the 15 institutions indicated that these prints were processed to archival permanence, although two additional institutions reported that "some" of their prints are archival.

Only one institution requires that prints submitted for curation by outside researchers be processed to archival standards, although those standards are not stated nor are the prints routinely checked to ensure that they are processed for permanence.

Prints seem to be stored with less care or consistency than negatives. Two institutions use commercial (i.e., highly acidic) folders, four use binders, one mounts the prints on cards (the cards are acidic and the mounting tissue is damaging to the print), two use acid free envelopes for storage, and one institutions remarked that their prints were stored "everywhere."

Color Transparencies

Fifteen of the sixteen institutions report curating color slides. The bulk of these slides are Kodachrome (10% to 90%, average of 67%), although Ektachrome accounts for 100% of one collection (range of 10% to 100%, average of 33%). Other slides are uncommon. Storage is primarily by slide pages and the samples sent all appear to be stable and archival. Five institutions store at least part of their collection in metal cabinets and three report using plastic boxes (which probably off-gas plasticizers).

Six of the institutions report constant environmental control in the area of slide storage, although only four can provide temperature ranges and only two can provide humidity ranges. Those two institutions which offered complete data report storage at temperatures of $60\pm5^{\circ}$ F and $68\pm2^{\circ}$ F and relative humidities of $45\pm4\%$ and $50\pm5\%$. Three of the six indicate that the humidity is monitored, while three do not maintain any monitoring. The remaining nine institutions report temperatures fluctuating from 65 to 90° F and relative humidity ranging from 40% to 90%.

Three institutions report that they have no slide

duplicates, while twelve indicate that there are duplicates of some, but not all slides. Twelve institutions allow the projection of all of their slides, while one does not allow the projection of any of the collection. Two institutions report that projection of some slides is allowed.

Paper Records

All sixteen of the respondents reported that they curated paper records. Only 10 of the institutions could estimate the linear feet of documents that they maintain and the total is at least 1190 linear feet. Half indicated that their holding were unique in the state, five institutions indicate that the percentage of their unique records range from 20% to 90% (average is 65%), and three institutions report that they do not know what documents are unique to their facility. Only five institutions routinely store duplicates of all records separately from the originals, although an additional four institutions maintain duplicates of some records. Those records which are duplicated are photocopies in seven cases and microfilm copies in two.

Only four institutions know that some of their paper records are on acid-free or archival papers and the average percentage of documents on archival paper among these four institutions is only 5% (range of 1% to 10%). A total of 41 different forms used by nine different institutions were supplied for analysis. Everyone of these forms revealed an acid pH (<6.0) and all contained alum size. The most common papers used are photocopy paper (one sample, Cascade X-9000, yielded an acid pH of <6.0 and tested positive for alum size). These papers, as previously discussed, are expected to have a lifespan of about 50 years.

Of the four institutions which accept documents from other researchers, only one requires that the records be on archival paper, although that institution does not examine the documents to ensure that those requirements are being met. None of the institutions surveyed had any requirements regarding the writing media used.

Most institutions (10 out of 12 responses) do not permit smoking, eating, or drinking in the document storage areas. Eight of the sixteen institutions claim to have constant environmental controls, although three of those institutions do not know what the controls are and only four institutions monitor the temperature and humidity on a regular basis. Of those that claim controls, temperatures range from 55° to 72° F and relative humidity ranges from 41% to 60%. For those institutions claiming no controls, temperature ranges of 50° to 90° F and relative humidity ranges of 40% to 90% were reported.

All institutions (except for one no response) indicated that their documents were stored in folders and thirteen of those

institutions use highly acidic commercial folders. Only three institutions report the use of acid-free folders. Over size documents are stored in a variety of ways, including flat at fourteen facilities, rolled at nine, and folded at seven. Only one institution reports that any of its documents are encapsulated.

Only four institutions have a policy regarding periodic inspections of their paper holdings. The time period involved was reported to range from yearly to every two years, although one response was simply "periodic" and another was at unknown intervals. Only two institutions have disaster plans which incorporate the paper records. One plan was developed in 1982, was undated in 1988, but has never been tested. The other plan was developed in 1984, is updated yearly, but also has never been tested.

Evaluation of Records Care

It is clear from these questionnaires that the archaeological record in the Southeastern United States is in jeopardy. Very few of the site forms, which contain the basic information of each state's cultural heritage, are on paper which will survive to the year 2030. Since many of these forms were probably completed in the 1930s, it is likely that a number of documents are coming, right now, to the end of their serviceable life. Likewise, very few of the documents which contain the primary information on excavated sites are on archival paper. Few of the files are acid free. Very few files are duplicated and stored in separate buildings for security. Records are stored in every possible way at most institutions -- flat, rolled, folded. The documents are frequently stapled and a number of different items are frequently placed into one file. There are no meaningful requirements concerning the types of ink that are used on the documents.

Photographic materials, while largely stored in archival files of one sort or another, are rarely processed with archival permanence in mind. Prints are not made of negatives, so there is no safety margin. Slides, with their high sensitivity to light and heat, are routinely allowed to be projected.

Environmental controls are clearly inadequate in most facilities, and the adequacy in the rest is incompletely or poorly documented. While this survey did not consider aspects of building condition or security, these are probably equally significant concerns. Likewise, exposure of documents and photographic materials to both natural and artificial lighting is a major concern Disaster plans are rare and frequently cover only parts of the documentary collections. Policies frequently allow the exposure of irreplaceable documents to the dangers of smoking, eating, and drinking. Few institutions have any

meaningful inspection of documents to assess their condition and the extent and content of some collections has never be determined.

This survey, then, has revealed an alarming situation. Much of the irreplaceable archival material relating to the prehistory of the Southeast is clearly at risk. Many of the site forms, excavation files, photographs, and slides will probably not survive another 20 years of benign neglect. This situation requires that we, as archaeologists, begin to seriously accept our responsibility to ensure the preservation of these records into the next century.

Recommendations and Costs

Perhaps the first step which needs to be taken is to identify within each institution the unique archaeological documentation it possesses. In addition, it is likely that we will be forced to establish priorities regarding document preservation. Some documents will simply be too damaged and others, while salvageable, may not warrant the expense. Our limited resources must be wisely spent and those decisions can perhaps best be determined by curatorial facilities within a single state meeting and exploring their collections. This step is perhaps the least costly of the various suggestions since it requires only staff time.

The archaeological community, as part of this first step, must also begin to take bold steps to develop a strong computer data base. While electronic media have their own inherent problems, this approach may offer long-term solutions to the overflow of paper records and inability to retrieve significant documents quickly.

The second step is to develop, disseminate, and enforce strict guidelines by each curatorial facility for the documents that it will accept. Guidelines have been established by The Charleston Museum and the Virginia Division of Historic Landmarks (Appendices 4 and 5). It would be self-defeating to improve the condition of existing collections while an institution continues to accept site forms and field records which will become equally serious "preservation time bombs."

Minimally these guidelines should require:

1. All written documentation should be on acid-free paper with a minimum 2% calcium carbonate buffer and free of groundwood and alum size. Examples of such paper include Howard Permalife or University Products PermaDur.

2. Only pencil, (non-film) carbon typewriter ribbon, or

archival ink (i.e., Pigma Acid-Free Fade-Proof pens, Black Actinic ink, Conservation Resources Archival Ballpoint ink pens) should be allowed on paper documents.

3. All field notes should be provided to the facility in acid-free, buffered folders. Oversized materials should be supplied flat. If necessary, one lose fold (with the grain of the paper, not against) is acceptable. The materials, less desirably, may be loosely rolled on acid-free, buffered cardboard tubes, or regular tubes first covered with acid-free paper or mylar.

4. Black and white film should be processed for archival permanence, following the specifications established by the curatorial facility (e.g., Keefe and Inch 1984). The facility should routinely spot check all negatives. Enlargements or contact sheets should be on fiber-based paper (there seems to be little reason to require archival processing of contact sheets, although consideration should be given to requiring archival processing of enlargements). The negatives and prints should be provided to the facility in archival holders, as specified by the facility.

5. Consideration should be given to limiting acceptance of color transparencies to specific types of film, processed by the original manufacturer (e.g., only Kodak films, or perhaps only Kodachrome, processed by Kodak). Slides should not be projected prior to acceptance by the institution. Slides should be labeled and provided the facility in archival holders, as specified by the facility. The institution should consider requiring both original and duplicates of each image.

The costs to the curatorial facility associated with these changes will be minimal since these requirements apply to collections "donated" by outside researchers. The costs to the specific project will, of course, vary upon the type and extent of the research. But, if all curatorial facilities within a state develop essentially identical requirements that are consistently enforced, the cost of preserving field records will be spread among all of the archaeologists doing work within that state. In addition, the difference in cost between preparing field records to archival conditions and ignoring their long term condition is not actually that great -- what cost can possibly be placed on the lost of irreplaceable documents relating to our cultural heritage.

For example, the cost of archival Permalife paper, suitable

for photocopying field records, costs from $7.25/ream to $8.85/ream in bulk, while good photocopier paper (such as Hammermill FORE 9000DP) costs about $8.75/ream in bulk. Of course it is possible to purchase common photocopier paper for as little as about $7.00/ream and this very inexpensive copier paper may be routinely used by many institutions. The difference, then, can be as much as an additional $0.004 per copy to ensure that the paper survives 200 rather than 50 years.

File folders for the records, if commercial grades are used, might cost from $9.90 to $13.00/100, depending on the quality. Archival folders, because of the heavier weight of the paper, would cost from $12.00 to $20.00, depending on the manufacturer and quantity ordered. While in this case the cost differential could be as much as $0.19 per folder, with careful purchasing the difference could be reduced to about $0.11 per folder. This is a more significant difference than the paper, but these folders will probably never be replaced in our lifetime and when the costs are examined from the perspective of potential lifespan, the least expensive commercial folders are costing about $0.002/year, while the most expensive archival folder is costing only $0.001/year.

Miscellaneous supplies add additional costs to archival preservation. For example, stainless steel staples cost about $20/box, while common staples cost $3 to $5/box. Stainless steel paper clips cost about $5/box, while "regular" paper clips cost about $4/box. Archival adhesive labels cost about $5.50 to $5.75/100, while commercial labels cost about $4.75. There are commercially available pens available which cost no more than $.58 each, while archival pens will cost about $2.00 each (although refills for one brand of archival ball point pen are available for as little as $1 each). If document cases are used, their costs, for small quantities, can range from $2/box to $4.60/box, depending on the quality.

The costs associated with archival film processing are more difficult to establish, since much of the black and white process involves an increase in staff time. The costs associated for commercial archival processing are high and this work would need to be done "in-house." The additional chemicals, however, would add little more than a few cents to each roll of film or each print. The storage media for black and white negative and color slides costs from $20 to $26/100, although bulk purchasing can reduce theses costs.

These figures suggest that if archaeologists would devote as little as 1% of their budgets to the preservation of their field records it would be possible to ensure the preservation of these documents for future researchers. One surveyed institution voiced the objection that if "archival" standards were required of outside archaeologists, "we'd have the collections but no

documentation." Clearly it is essential that viable standards be enacted and strictly adhered to. If a particular institution is required by law to accept collections, then the law must be changed to require that documentation meeting minimum preservation standards is provided.

Third, the repositories of archaeological archives, such as field records and site files, must begin to find more satisfactory physical plants. This study clearly documents the inadequacy of available HVAC facilities and I imagine that a more detailed survey would have found additional problems with the total structure. One respondent reports that, "we are a state agency and subject to the department's placement of us in rental space. Currently, we are in a basement area of a historic building. The temperature and humidity vary radically day to day." Another institution has been without air conditioning for the bulk of the summer because of a variety of mechanical failure. These are not unique situations, but they must be recognized as doing untold damage to irreplaceable records. Failure to make substantive changes condemns these records to certain destruction.

While it frequently is not possible to redesign or purchase HVAC equipment, or it may be impossible to alter a historic building, it is possible to begin monitoring, on a regular basis, the environmental conditions of the storage area. This can best be done with a recording hygrothermagraph, available from a number of suppliers for about $600. In addition, a sling psychrometer, which costs about $50, is necessary to calibrate the instrument at least once a week. With these records in hand it is possible to clearly document the environmental fluctuations of the storage area. This will certainly help when funds are requested for improved HVAC controls or movement to a new facility. In addition, it will be possible to quantify the damage to your collections. In addition, it may be possible to use relatively inexpensive dehumidifiers (costing $200 to $500) to control excess relative humidity, one of the major enemies of both paper and photographic materials. There are additional options which can be taken to improve the environmental stability of the records, such as the use of small window air conditioners and fans to improve circulation of air.

Fourth, the repositories of state site files where primary documentation is the paper form should begin printing their site forms on archival paper, using archival binding methods, and require the use of archival inks. Not only should all new forms meet the minimum preservation standards outlined here, but the current forms should be rapidly replaced with archival copies. For the average institution, with 15250 four-page site files, the cost of archival photocopy paper would be only $450, although this does not include machine rental costs, or the time of several work-study students to perform the task. In addition, at

least $1800 would be required for archival folders and another $500 would be needed for miscellaneous supplies. As a consequence, for less than $2800 the average state site file repository could convert its deteriorating site file records to the archival permanence they deserve.

Fifth, the repositories of site excavation data need to evaluate the stability of existing collections and their need for immediate preservation treatment, such as replacement photocopying of records on archival paper and the re-fixing or more intensive washing of black and white negatives to remove excess hypo. It is impossible to offer any estimate for either the time or cost of such activities, or even the preliminary evaluation process. Failure to undertake this step, however, will result in the loss of extraordinarily important and unique documents. At least one facility questioned has taken the bold step of requesting funds from the National Science Foundation to completely upgrade the collections. In addition, it would be appropriate to explore other avenues of grant funding, perhaps through the Institute of Museum Studies, to conduct needed collection preservation.

Sixth, each institution which houses archaeological records needs to implement a series of policies dealing with eating, drinking, and smoking in the storage areas. All of these activities should be eliminated since they endanger the collections both directly (such as through fire) and indirectly (such as through increased pest control problems). Each institution should develop a detailed disaster plan and periodically test and update the plan. This plan should cover the reasonable natural and man-made disasters particular to each state (see Anonymous 1982; Murray 1986; O'Connell 1983; Appendix 6).

Seventh, there needs to be an increasing awareness among graduate programs in archaeology that conservation and archives management are essential skills for the archaeological community. While few graduate of such programs actually go into records management at curatorial facilities, a greater sensitivity to the needs and requirements of the paper and photographic records is essential if these documents are to be preserved. Coupled with this increasing emphasis on conservation and archives management, there must be the development of clear ethical statements among archaeologists which acknowledge the need to ensure the preservation of these records and which place the burden of that preservation on the individual or group which generates the records. We must begin to recognize that it is not ethical to dig sites, record findings, and allow these records to slowly deteriorate while we begin the cycle anew.

Sources Cited

Clapp, Verner W.
1972 The Story of Permanent/Durable Book-Paper. Restaurator Supplement 3: 1-51.

Eastman Kodak Company
1979 Preservation of Photographs. Eastman Kodak Company, Rochester.

Keefe, Laurence E., Jr. and Dennis Inch
1984 The Life of a Photograph: Archival Processing, Matting, Framing, and Storage. Focal Press, Boston.

Kenworthy, Mary Anne, Eleanor M. King, Mary Elizabeth Ruwell, and Trudy Van Houten
1985 Preserving Field Records: Archival Techniques for Archaeologists and Anthropologists. The University of Pennsylvania Museum, Philadelphia.

Lindsay, Alexander J., Jr. and Glenna Williams-Dean
1980 Artifacts, Documents, and Data: A New Frontier for American Archaeology. Curator 23:19-29.

Lindsay, Alexander J., Jr., Glenna Williams-Dean, and Jonathan Haas
1980 The Curation and Management of Archaeological Collections: A Pilot Study. Interagency Archaeological Services, Heritage Conservation and Recreation Service, Washington, DC.

Murray, Toby
1986 Basic Guidelines for Disaster Planning in Oklahoma. Ms. on file, University of Tulsa Preservation Officer, Tulsa.

O'Connell, Mildred
1983 Disaster Planning: Writing and Implementing Plans for Collections-Holding Institutions. Technology and Conservation. Summer: 18-26.

Ritzenthaler, Mary Lynn
1983 Archives and Manuscripts: Conservation. Society of American Archivists, Chicago.

Ritzenthaler, Mary Lynn, Gerald J. Munoff, and Margery S. Long
1984 Archives and Manuscripts: Administration of Photographic Collections. Society of American Archivists, Chicago.

Ruwell, Mary Elizabeth
1985 Introduction. In Preserving Field Records: Archival Techniques for Archaeologists and Anthropologists, edited by Mary Anne Kenworthy, Eleanor M. King, Mary Elizabeth Ruwell and Trudy Van Houten, pp. 1-6. The University of Pennsylvania Museum, Philadelphia.

Streit, Samuel
1982 Antediluvian Considerations: The Library Structure and Disaster Prevention. Conservation Administration News 11:3-5.

Van Houten, Trudy
1985 Preservation of Paper Records. In Preserving Field Records: Archival Techniques for Archaeologists and Anthropologists, edited by Mary Anne Kenworthy, Eleanor M. King, Mary Elizabeth Ruwell and Trudy Van Houten, pp. 19-40. The University of Pennsylvania Museum, Philadelphia.

APPENDICES

1. Chicora "Site Records Preservation Questionnaire"
2. List of Supplies and Suppliers
3. NEDCC Storage Enclosures for Photographic Prints and Negatives
4. Curation Standards for The Charleston Museum, Charleston, SC
5. Curation Standards for Virginia Division of Historic Landmarks
6. SOLINET Sample Checklist for Disaster Prevention and Protection

APPENDIX 1
SITE RECORDS PRESERVATION QUESTIONNAIRE

Institution and address:_____
_____
_____

Form prepared by:_____ Title:_____

Check one: __You may cite our institution's participation in this study
__Please keep our institution's participation in this study confidential

Check one: __Yes, please send a draft copy of your study to me for review and comment
__No, it is not necessary to send a draft of your report, but we would appreciate receiving a final version

Site Forms

1. Does your institution use a paper site form as its main record of site data? __yes __no. IF YES, PLEASE INCLUDE THE CURRENT PAPER (HARD COPY) SITE FORM THAT YOUR INSTITUTION USES. IF MORE THAN ONE TYPE OF FORM IS USED PLEASE SEND SPECIMENS OF EACH TYPE. __sample enclosed

2. Is your institution the official (actual or de facto) repository for site forms in your state? __yes __no

3. Are copies of the site forms stored separately from the originals at your institution? __yes __no
   If yes, are these __photocopies __carbon copies __carbonless copies __microfilm copies __magnetic data copies

4. Are copies of the site forms stored elsewhere in your state (besides with the individual reporting specific sites)? __yes __no
   If yes, are these __photocopies __ carbon copies __carbonless copies __microfilm copies __ magnetic data copies __originals

5. IF PHOTOCOPIES OF SITE FORMS ARE MAINTAINED BY YOUR INSTITUTION PLEASE SEND A REPRESENTATIVE SAMPLE (use your normal photocopier, your normal paper, and normal copying process) __copy enclosed __not applicable

6. Are the original site files stored in folders? __yes __no
   If yes, what type? __commercial office folders __acid-free, buffered __other:_____
   If no, how are they stored? _____

7. If the site forms are stored in folders, is other material placed in the folder with the site form? __yes __no

8. If the site forms are placed on magnetic media, how often is this information recopied? _____

9. Does your institution have a policy regarding the types of writing media allowed on site forms? __yes __no
   If yes, what is allowable? _____

10. Is there constant (24-hour/day, year-round) environmental control in the site form storage area? __yes __no
    If yes, what is the maintained temperature _____ relative humidity _____
    If yes, is temperature and RH data monitored through the use of a recording hygrothermograph? __yes __no
    If no, what is the approximate range of temperature _____ relative humidity _____

11. Does your institution allow:
    smoking in the site form storage area? __ yes __no
    eating/drinking in the site form storage area __yes __no

12. Approximately how many original site forms are on file at your institution? _____ How many linear feet of site files are present? _____

13. Does your institution have a policy to periodically examine the original paper records to determine their condition? __yes __no
    If yes, how often? _____

14. Does your institution have a disaster plan which incorporates the site files? __yes __no
    If yes, when was the plan developed? _____ How often is the plan updated? _____ Has your institution ever conducted a disaster plan drill? __yes __no

<u>B/W Photographic Materials</u>

1. Does your institution store b/w photographic materials? (check if appropriate) __associated with site forms __from in-house projects __from projects conducted by other archaeologists

2. How are these b/w negatives stored? __paper envelopes

__glassine envelopes __mylar envelopes __as strips in pages __other:_____ PLEASE ENCLOSE A SAMPLE OF YOUR STORAGE MEDIA. __sample enclosed

3. Who processes in-house b/w negatives? __archaeologist __amateur photographer/volunteer __professional photographer on staff __commercial photographer/contracted out

4. Are in-house negatives processed to archival permanence? __yes __no __don't know
   If yes, what methods are used:_____
   _____
   _____
   _____
   _____
   _____
   If yes, are batches of negatives periodically checked to ensure quality control? __yes __no

5. If your institution accepts b/w negatives from other institutions or archaeologists, do you require that these be processed to archival permanence? __yes __no __not applicable
   If yes, does your institution require documentation of the methods used? __yes __no
   If yes, are negatives accepted for storage checked for archival permanence? __yes __no

6. Are all negatives routinely printed? __yes __no
   If yes, are they printed as __individual contact prints __contact sheets __enlargements
   If yes, who prints in-house file photographs? __archaeologist __amateur photographer/volunteer __professional photographer on staff __commercial photographer/contracted out

7. Are in-house prints processed to archival permanence? __yes __no __don't know
   If yes, what methods are used:_____
   _____
   _____
   _____
   _____
   _____
   If yes, are batches of prints periodically checked to ensure quality control? __yes __no

8. If your institution accepts b/w prints from other institutions or archaeologists, do you require that these be processed to archival permanence? __yes __ no __not applicable

If yes, does your institution require documentation of the methods used __yes __no

9. How are prints stored? _____
_____
_____

Color Transparencies

1. Does your institution store color transparencies (slides)? (check if appropriate) __associated with site forms __from in-house projects __from projects conducted by other archaeologists

2. What types of transparencies occur in your collections (please indicate approximate percentages, if possible)? __Kodachrome (___%) __Ektachrome (___%) __other (___%)

3. How are these color transparencies stored? __metal slide cabinet __in slide pages __frozen storage __other:_____ IF STORED IN SLIDE PAGES PLEASE ENCLOSE A SAMPLE. __sample enclosed

4. Is there constant (24-hour/day, year-round) environmental control in the slide storage area? __yes __no
   If yes, what is the maintained temperature _____ relative humidity _____
   If yes, is temperature and RH data monitored through the use of a recording hygrothermograph? __yes __no
   If no, what is the approximate range of temperature _____ relative humidity _____

5. Does your institution maintain duplicates of slides? __yes __no __of some but not all

6. Does your institution allow projection of stored slides? __yes __no __only limited slides

Paper Records (field forms, catalogs, maps, etc.)

1. Does your institution store paper records? (check if appropriate) __associated with site forms __from in-house projects __from projects conducted by other archaeologists

2. Are copies of these paper records stored elsewhere in your state? __yes __no
   If yes, approximately what percentage of the records are unique to your institution? _____%

3. Are copies of the paper records stored separately from the originals at your institution? __yes __no
   If yes, are these __photocopies __microfilm copies __other:__

_____

4. What approximate percentage of paper records stored by your institution are on:
   "archival" or "acid-free" types of paper (i.e., Permabond, Permalife, etc.) _____%
   commercial papers and photocopy papers (including cotton bonds) _____%
   unknown papers _____%

5. Does your institution have specific forms for archaeological field notes (i.e., daily reports, feature forms, photographic forms, burial forms, catalog forms, etc.)?
   __yes __no
   PLEASE INCLUDE ORIGINALS OF YOUR INSTITUTIONS' CURRENT FORMS
   __ sample(s) enclosed

6. If your institution accepts paper records from other institutions or archaeologists, do your require that these be on "archival" or "acid free" paper? __yes __no
   If yes, are paper records accepted for storage checked for their archival permanence? __yes __no

7. Does your institution have a policy regarding the types of writing media allowed on permanent, original paper documents? __yes __no
   If yes, what is allowable? _____

8. Does your institution allow:
   smoking in the paper record storage area? __ yes __no
   eating/drinking in the paper record storage area __yes __no

9. Is there constant (24-hour/day, year-round) environmental control in the paper record storage area? __yes __no
   If yes, what is the maintained temperature _____ relative humidity _____
   If yes, is temperature and RH data monitored through the use of a recording hygrothermograph? __yes __no
   If no, what is the approximate range of temperature _____ relative humidity _____

10. Are letter sized documents stored in folders? __yes __no
    If yes, what type? __commercial office folders __acid-free, buffered __other:_____
    If no, how are they stored?_____

11. How are over-sized documents stored? __folded __rolled in tubes __flat storage __encapsulated
    __other:_____

12. Approximately how many linear feet of paper records are

present at your institution? _____

13. Does your institution have a policy to periodically examine the paper records to determine their condition? __yes __no
If yes, how often? _____

14. Does your institution have a disaster plan which incorporates these paper records? __ yes __no
If yes, when was this plan developed? _____ How often is the plan updated? _____ Has your institution ever conducted a disaster plan drill? __yes __no

General Comments

If there are areas which need additional explanation please use this sheet to do so. We appreciate any comments you might have and particularly appreciate your time and interest in completing this form. BEFORE MAILING THIS QUESTIONNAIRE BACK, PLEASE BE SURE TO ENCLOSE THE REQUESTED FORMS AND NEGATIVE/SLIDE CARRIERS.

APPENDIX 2
List of Supplies and Suppliers

The mention of trade names or commercial products in this study does not constitute the endorsement or recommendation by Chicora Foundation, Inc.

1. Cole-Parmer Instrument Company
   7425 North Oak Park Avenue
   Chicago, Illinois 60648
   1-800-323-4340

2. Conservation Materials, Ltd.
   Box 2884
   240 Freeport Blvd.
   Sparks, NV 89431
   702-331-0582

3. Conservation Resources International
   8000-H Forbes Place
   Springfield, VA 22151
   703-321-7730

4. Fisher Scientific
   P.O. Box 4829
   2775 Pacific Drive
   Norcross, GA 30091
   1-800-241-8912
   (additional braches in Raleigh, Orlando, Washington, and Baton Rouge)

5. The Hollinger Corp.
   P.O. Box 6185
   3810 S. Four Mile Run Drive
   Arlington, VA 22206
   703-671-6600

6. Light Impressions Corp.
   P.O. Box 940
   439 Monroe Street
   Rochester, NY 14603
   1-800-828-6216

7. University Products, Inc.
   P.O. Box 101
   South Canal Street
   Holyoke, MA 01041
   1-800-628-1912

Ball point pens/refills, archival ink - #3

Document cases, archival - #3, 5, 6, 7

Enclosures, print, negative, and slide - # 3, 5, 6, 7

Fade cards, blue wool - #2

File folders, buffered, acid-free - #3, 5, 6, 7

Gloves, white cotton - #4, 6, 7

Hygrothermographs, recording - #1, 2, 4, 6, 7

Indicators, temperature/humidity (non-recording) - #1, 2, 4, 6, 7

Ink, archival - #6, 7

Labels, pressure sensitive, acid free - #5, 7

Mylar - #2, 3, 6, 7

Paper, Howard Permalife bond - #3, 5, 6, 7

Paper clips, stainless steel - # 3, 7

Pens, archival ink - #7

pH tests - #2, 3, 4, 6, 7

Photographic test kits - #6, 7

Staples, stainless steel - #7

Tape, document repair - #2, 6, 7

Tri-Test kit - #6, 7

Tubes, lignin and acid free - #7

UV light filter sleeves (for fluorescent tubes) - #2, 3, 6, 7

APPENDIX 3.

Northeast Document Conservation Center
Abbot Hall, School Street, Andover, Massachusetts 01810 (617) 470-1010

STORAGE ENCLOSURES FOR PHOTOGRAPHIC PRINTS AND NEGATIVES

Storage enclosures for photographic prints and negatives are available in a variety of materials and formats. One must decide between buffered or non-buffered paper, paper or plastic enclosures, polyester or triacetate sleeves, sleeves or envelopes. To choose the proper enclosure requires a knowledge of the alternatives. This handout reviews the various options, discussing the advantages, disadvantages, and special precautions for each.

PAPER MATERIALS

-- Paper enclosures are opaque, protecting the object from light. However, this makes viewing difficult, requiring the removal of the object from the enclosure before it can be looked at. This increases the handling and subsequent abrasion and fingerprinting of the image.

-- Paper enclosures are porous, protecting the object from the accumulation of moisture and detrimental gases. This is especially important for cellulose nitrate and early safety film negatives where the gases generated by the deterioration of the support material are harmful to the photograph.

-- Paper enclosures are generally less expensive than plastic enclosures.

-- Paper enclosures are easy to write on.

-- Paper enclosures are available in buffered and non-buffered stock; both are of archival quality. Direct contact of buffered paper with photographic emulsions is presently being questioned. Buffered storage enclosures are not recommended for color images, cyanotypes, or albumen prints. They are recommended for cellulose nitrate and early safety film negatives, brittle prints, and prints on brittle acidic mounts. Research is yet to be conducted to determine the effect of buffering agents on many photographic processes. However, if the environment in which the images are stored has a low relative humidity (below 50%), then buffered materials should present few, if any, problems.

-- Paper enclosures should not be made of Kraft or glassine paper as the impurities in these materials will cause deterioration of the photograph.

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— Paper enclosures should not be made of Kraft or glassine paper as the impurities in these materials will cause deterioration of the photograph.

Seamed Paper Envelopes

An envelope is an enclosure with one open end; it may or may not have a protective top flap. With paper envelopes the seam should be located at the sides and across the bottom. The adhesive should be non-acidic and unreactive with silver. A thumb cut is not recommended, as it invites the placement of the finger on the photograph during its removal from the enclosure. A top flap may be desirable in order to prevent dust from entering the envelope and causing abrasion of the image. When storing photographs in seamed envelopes, the photograph should be inserted with the emulsion away from the seam.

Seamless Paper Envelopes

The seamless envelope does not have any adhesive. The envelope is formed with three or four flaps attached to a back which fold over to produce a pocket. The fourth flap, if present, leaves the envelope without any opening, protecting the object within from dust and dirt. The construction of these envelopes encourages the user to place the object on a flat surface in order to open them. This can be an advantage for brittle or fragile items such as glass plate negatives.

Paper Folders

A folder is a sheet of paper which is folded in half. It is closed only on one side and therefore must be kept in a properly fitted box in order to effectively hold the image. If used for vertical storage in files, the photograph stored inside must be well supported to prevent sagging or curling. Folders are simple to make and are most useful for large or mounted items.

PLASTIC MATERIALS

-- Plastic enclosures have the great advantage of allowing an image to be viewed without removing it from the enclosure. This greatly reduces the chance of abrading, scratching, or fingerprinting the photograph.

-- Plastic enclosures seal the object from the atmosphere. Since most chemical deterioration in a photograph is catalyzed by the presence of moisture and sulphides in air, such protection will prolong the life of the image.

-- Plastic enclosures can trap moisture and cause ferrotyping (sticking with resulting shiny areas) of the image.

-- Plastic enclosures with matte or frosted surfaces should be avoided since they can be abrasive and may scratch the emulsion.

-- Plastic enclosures can be very difficult to write on.

-- Plastic enclosures can be flimsy and may require additional support, such as archival quality Bristol board. On this board can be recorded any information which should accompany the image.

-- Plastic enclosures of archival quality may be made of polyester; polypropylene, triacetate, and polyethylene. These plastics are chemically stable and have a neutral pH. POLYESTER is the most inert and rigid of the four. It generates static electricity which can attract dust, and it is expensive. Polyester enclosures should be either DuPont's Mylar D or ICI Melinex #516. POLYPROPYLENE is as rigid and strong as polyester when in sleeve format, but is almost as soft as polyethylene when it is used for ring binder storage pages. TRIACETATE (Kodak transparent sleeves) is softer than polyester, more easily scratched, less dimensionally stable, and not as strong a support. POLYETHYLENE is the softest, most easily scratched, and least rigid of the four plastics.

-- Plastic enclosures made from POLYVINYL CHLORIDE (PVC) are unacceptable for archival photographic storage. This plastic is not chemically stable and will cause deterioration of a photograph over a period of time.

Plastic Envelopes

Plastic envelopes normally have heat-sealed seams, which eliminates any potential problems with adhesives. Both polyethylene and polyester envelopes have been marketed by companies selling conservation products.

Plastic Folders

These are usually made from polyester. They may be successfully used in conjunction with paper envelopes, the polyester folder protecting the image from handling whenever it is removed from the envelope.

Plastic Sleeves

A sleeve is an enclosure open at two opposite sides. It can be made from either triacetate, polyester, or polypropylene. One particular sleeve design, available in both polyester and polypropylene, has superior handling qualities. This sleeve is a one-piece construction with a self-locking fold on the top. The top fold provides for easy insertion and removal of the photograph without sliding the image across the polyester surface.

Polyester Encapsulation

Polyester encapsulation is the enclosing of the photograph between two sheets of polyester, sealed on all four sides with double-sided tape or by special polyester welding machines. Encapsulation provides maximum support and protection for a photograph, completely sealing it off from the environment. This tends to be a permanent enclosure as removal and re-encapsulation of an object takes time and can become expensive. Encapsulation is an excellent process for storing fragile prints.

Ring Binder Storage Pages

These pages are made to fit three-ring binders with slipcases. They are available in a wide variety of formats, sizes, and materials, including polyester, polypropylene and polyethylene. They are an excellent alternative for small, concentrated collections of uniform size.

Polyester Sheet - Matboard Folder

This folder consists of a sheet of polyester and a sheet of matboard of the same size, attached together along one long edge with double-sided tape. The matboard gives needed support. The polyester allows the image to be easily viewed. These folders are best stored flat. They are particularly helpful for storage of oversize photographs.

Polyester Sheet Within a Paper Folder

This enclosure consists of a paper folder with a polyester sheet attached along an inner edge, opposite the center fold. The attachment is made with double-sided tape. The polyester holds the object in place and protects it from dirt and handling, but allows for easy viewing and removal. The paper folder provides support to the image and protects it from light. These folders are especially useful for small fragile prints.

Many of the enclosures available for photographic storage have been discussed in this handout. Each has been discussed individually, but often two enclosures can be combined to form another format with its own characteristics. An example would be the use of polyester folders with seamed paper envelopes. Each of these systems has advantages and disadvantages. The final choice of enclosure will depend on the particular needs of a collection and the available funds.

APPROXIMATE COST OF 8" x 19-0" ARCHIVAL ENCLOSURES (1986)

Material	Enclosure	Cost Image
Paper	seamed envelope	.19
	seamless envelope	.25
	folder (letter size)	.15
Plastic	envelope: polyester	.85
	polyethylene	.13
	folder: polyester	.35
	sleeves: polyester	.35
	polypropylene	.22
	ring pages: polyester	.70
	polypropylene	.21
	polyethylene	.17
	encapsulation: polyester	.48 + labor
	polyester sheet within a paper folder (letter size)	.38 + labor
	polyester sheet - matboard folder	.65 + labor

These materials may be purchased from conservation supply companies. Prices will vary considerably depending on the supplier and quantity purchased. Before making major purchases contact the various suppliers for samples. There will be variations in materials between the companies, even for products which one would assume to be identical.

APPENDIX 4.

CURATORIAL REQUIREMENTS

Archaeology Department - The Charlestor Museum

Physical Conditions of the Collection

1. All artifacts are to be provided to the Museum in clean form, exclusive of soil and ethnobotanical samples. Materials which are suitable for washing should be washed, other material should be dry cleaned.

2. All artifacts are to be provided to the Museum in stable condition. Materials requiring conservation or preservatwon to ensure their stability should be so treated prior to submittal. No artifacts will be accepted which still require special treatment prior to curation.

3. All artifacts are to be provided to the Museum in safe, non-hazardous condition. Any materials which might present a physical danger to the Museum staff or the public should be specifically brought to the attention of the Curator in writing.

4. Normally artifacts should be completely dry prior to bagging and submittal to the Museum.

Cataloging

1. All materials are to be cataloged using the current Museum accessioning system. At the completion of the fieldwork and sorting of the artifacts, a preliminary catalog list is to be provided to the Curator so that Museum catalog numbers may be assigned. These catalog numbers are to be transferred to all artifacts using tags, india ink, or other suitable marking.

2. Lot cataloging is acceptable in most cases. The catalog number should be clearly, legibly, and permanently placed on the bags, along with complete provenience information.

3. Study or other special specimens should be individually numbered with india ink or other appropriate methods. Numbers should be clear and legible. They should be placed on artifacts in such a way as not to distract from their educational, scientific, or display value.

4. The Museum will provide blank catalog cards for the collection, with instructions on their use. These cards are to be typed with complete information and returned with the collections.

Bagging/Boxing

1. All artifacts should be placed in 4-mil plastic bags with secure closures.

2. The bags should have the following information clearly marked on them: site name and number, provenience information (square, level, zone, feature, etc.), date of collection, and Museum catalog number. The bags should be marked with permanent ink; a clean legible paper tag placed in the bag is also satisfactory.

3. Artifacts should be boxed in low-acid boxes measuring 18 x 11 x 7½ inches. All boxes should be in good condition and sufficiently strong to withstand normal usage and stacking.

4. Artifacts should be boxed in numerical order. Packing should be tight and secure. Artifacts should not be allowed to shift in the boxes, nor should crushing occur when the boxes are stacked. Sufficient shock absorbent packing should be used to protect fragile items.

5. The outside of each box should be clearly and neatly labeled in the upper left hand corner with the following information: site name or number, catalog numbers contained inside the box, accession number, box number ____ of _____.

6. Artifacts which have been photographed for illustration in the final report or have been removed for special study should be removed from numerical sequence and separately boxed. These boxes should be labeled with the following information: site number, "Study Specimens", catalog numbers, box ____ of ____.The box numbers should be added to the end of the normal sequence. Each of these items should be individually numbered with the appropriate catalog number.

Field Notes

1. All original field notes should be provided in a logical, neat format. In addition, one photocopy of the field notes should be provided. The photocopy should be completely legible, with no omissions or faint copy. The photocopy should be on 100% cotton rag paper.

2. All field maps should be provided in the same condition as #1, above.

3. All pages should be 8½ by 11 inches or folded to those dimensions. No odd sizes or rolled tubes should be submitted.

Black and White Photographic Materials

1. All photographic material must be processed for archival permanence. This includes both slides and prints.

2. Negatives should be submitted in Vue-all Archival Polyethylene pages. No substitutions will be allowed. Each negative is to be numbered in india ink in the vicinity of the sprocket holes and these numbers should be keyed to a typed photo log. A contact sheet of each page is to be made after the negatives have been numbered.

3. The photo log numbers will be assigned by the museum upon submittal of a list of photographs or upon submittal of a total number of negatives which require numbers.

4. Each negative is to have a print made of it. The size should not be smaller than 4x5 inches nor larger than 5x7. The following information should be printed legibly on the back of the print: site number, provenience information, date of photograph, direction, and photo number. These file prints are to be submitted to the Museum in numerical order.

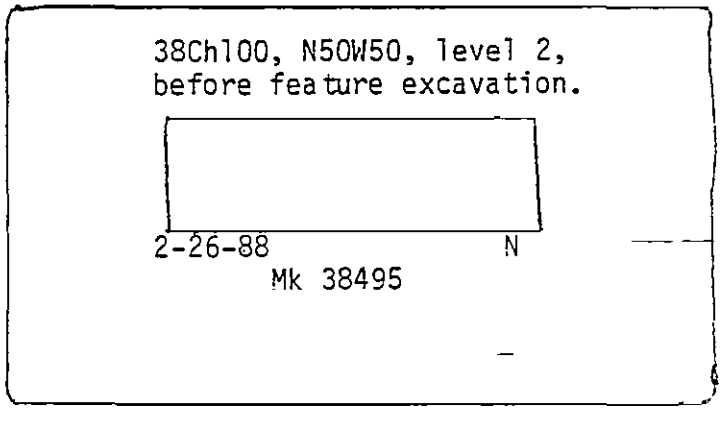
Color Slides

1. All color slides are to be submitted in Vue-all Archival Polyethylene pages.. No substitutions will be allowed. The slides and a typed photo log should be submitted.

2. The photo log number will not be the same as the field number. The appropriate photo log numbers will be assigned by the Museum upon submittal of a list of slides or upon submittal of a total number of slides which require numbers.

3. Duplicates of the same shot should be removed from the numerical order and sleeved separately. These should be labelled "duplicate slides".

4. All slides are to have the following information neatly and legibly written on the cardboard mount: site number, provenience (square, level, feature, etc.), date of photograph, direction of photograph, and file number. The information should be consistently placed as shown below.



APPENDIX 5.

Divisions
Historic Landmarks
Litter Control
Parks and Recreation
Soil and Water Conservation

B. C. LEYNES, JR.
Director

COMMONWEALTH of VIRGINIA

Department of Conservation and Historic Resources

Division of Historic Landmarks
H. Bryan Mitchell, Director

221 Governor Street
Richmond, Virginia 23219
Telephone (804) 786-3143

VIRGINIA DIVISION OF HISTORIC LANDMARKS

STATE CURATION STANDARDS

To ensure that the archeological collections of Virginia and their documentation are preserved in a manner that will facilitate their future use by researchers and the public, all collections and records must be processed in a manner that will contribute to their longevity. The following standards have been developed for the protection of collections of statewide significance held by the Virginia Research Center for Archeology. These standards are consistent with the Secretary of the Interior's Standards and Guidelines for Curation. The following procedures for processing and storage preparation should be followed in preparing artifact collections and documentation for submission to the VRCA. These recommendations have been divided into two major categories: 1) Artifacts and 2) Documentation.

ARTIFACTS

1) All artifacts should be cleaned. The only exception would be those which might provide more information through specialized analysis in their unwashed state, i.e., blood residue analysis.
2) Label artifacts with at least the state site number and provenience of recovery.
   a) For small collections (i.e. less than 200 objects) label all artifacts.
   b) For larger collections, label all diagnostics. The following artifact types need not be individually labeled: slag, oyster shell, fire cracked rock, flakes, window glass, nails, brick, mortar, and coal. These items can be grouped by material type within a provenience with at least one artifact labeled, placed in a plastic bag with the exterior permanently labeled, and a mylar strip or acid free paper label with the appropriate provenience information placed within the bag. Additions or deletions to this list may be made depending on the site.
   c) All bone that can be physically labeled should be labeled. Label small bones following the procedures outlined in item 2b.

d) Place other classes of material such as floral and soil samples in an appropriate sealable container and label with the provenience information.

e) Submit an explanation of the label information including coordinates for excavation unit numbers for all collections.

3) Label all artifacts with the recommended ink, sealant, and white backing when needed (see attached list). The procedure should consist of a layer of sealant or white acrylic backing first, then the label numbers covered by another coat of sealant.

4) Store all artifacts in perforated polyethylene, zip-lock plastic bags at least 2 ml in thickness. Perforation is necessary to allow air exchange and avoid cargo sweat.

5) Use archivally stable materials for those items requiring special packaging.

6) Place all artifacts for final storage in acid free boxes by provenience.

7) Label all artifact containers with site number and provenience.

DOCUMENTATION

1) Ownership of the collection must be clear. For donated or long term loan collections, proper documentation of the agreement must accompany the collection.

2) Submit a complete inventory of all recovered objects with the collection. In addition, a list of the documentary information submitted and a final report should accompany the collection.

3) A statement indicating whether conservation treatment was performed and a list of objects with a description of their treatments should accompany any collection.

4) If conservation has not been completed, provide a list of those objects needing treatment.

5) Prepare one stable copy of all original field documentation on acid free paper by a heat fusion process (eg. Xerox dry process). The original on acid free paper is acceptable. These will be submitted with the collection for curation.

6) Submit a master set of permanent record slides (Kodachrome) documenting the site to be curated with the collection. These slides should not have been projected because the intense light necessary to illuminate the slide can damage the emulsion. If slides are needed for use in lectures or other presentations it is recommended that a duplicate set be made. These should not be submitted for curation.

7) Label the archival set of all slides and prints with at least the state site number and provenience.

8) Prepare a catalogue of all photographic documentation with an explanation of the labeling information.

9) Store all slides, black and white negatives, and contact sheets in an archivally stable container.

These guidelines have been prepared in consultation with other Mid-atlantic archeologists and conservators. It is felt that by following the above recommendations the state's archaeological collections will be protected for future research. If you have any questions or need assistance, please contact Beth Acuff, Chief Curator, Virginia Division of Historic Landmarks, Richmond, Virginia (804) 786-3143.

RECOMMENDED SUPPLIES
(Brand names are illustrative, similar products of equal quality may be substituted)

Ink

Higgins Waterproof Drawing Ink Black India

Base coat for dark objects

Liquitex Titanium White Acrylic Paint

Sealant

B-72 in Tolulene diluted with acetone to 15% solution (available from Conservation Materials, Limited and other conservation supply houses)

Storage Containers

Hollinger acid free boxes
Polyethylene zip lock bags

APPENDIX 6.

Southeastern Library Network, Inc.
400 Colony Square, Plaza Level
1201 Peachtree Street, N.E.
Atlanta, Georgia 30361
Telephone (404) 892-0943
Toll-Free 1-800-999-8558
FAX (404) 892-7879

SAMPLE CHECKLIST FOR DISASTER PREVENTION & PROTECTION

SOLINET Preservation Program
April 1988

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Person conducting inspection: _____

Date _____

==========

	Acceptable (Yes/No)	Action Required	Completed
1. Building site			
Away from flood plain?			
Hurricane unlikely?			
Tornadoes unlikely?			
2. Outdoor hazards			
Railings, benches, planters, light/flag poles well anchored?			
Overhanging trees, branches trimmed?			
3. Roof			
Sloped/pitched (i.e., not flat) roof?			
Roof covering sound? (no leaks, cracks)			
Flashings present and intact?			
4. Drainage from roof (eaves, gutters, drains, downspouts, interior columns)			
Draining freely?			
Cleaned regularly?			
Drainage systems connected directly into sewer system?			

	Acceptable (Yes/No)	Action Required	Completed

5. Ground-level drainage

Good drainage around doors?
Basement floors water-proofed?
Sump pumps in basement?

6. Windows & skylights

Caulking/sealants sound?
Trees trimmed away?

7. Floors and ceilings

Air passages between floors identified?
Concealed spaces identified?
Fire protection in said spaces?

8. Fire safety

Annual fire marshall visit used wisely?
- floor plans given to Fire Dept.?
- high-priority collection areas noted?
- appropriate follow-up on reports?

Detection systems:
- smoke and ionization present?
- tested regularly?
- wired to outside monitoring station?

Suppression system (sprinklers, standpipes, portable extinguishers, Halon):
- automatic system present?
- adequate and regular inspection/maintenance?
- appropriate location(s) of extinguishers?

Staff trained in:
- interpretation of annunciator panels?
- sounding alarms?
- notifying fire department and others?
- using extinguishers?
- turning off power, HVAC, sprinklers, gas?
- closing fire doors?

Electrical wiring:
- no overloading?
- good condition?
- appliance cords in good condition and unplugged nightly (if appropriate)?

	Acceptable (Yes/No)	Action Required	Completed

9. Heating, ventilation, air-conditioning (HVAC) system

Effective temperature/humidity controls?
Automatic shut-off capacity?
Furnace inspected annually?
Air conditioning:
  no leaks?
  no mold present?
  effective drainage from pans?
  dehumidification capacity?
Ventilation: ability to exhaust?
Air filters:
  effective?
  changed regularly?

10. Water protection

Pipes & plumbing (including toilets, icemakers, freezers, and other water sources):
  not located above collections?
  pipes well supported?
  no leaks?
  pipe joints and valves in good condition?

Water detectors:
  present?
  inspected and functioning?

Sump pumps and back-ups available?
Appropriate dehumidifiers available?
No leakage/seepage through walls?
Protective enclosures for special materials (e.g., rare maps, archives) and fragile media (e.g., cassettes, diskettes)?

11. Stack areas

Shelves well braced?
No valuable collections under water sources?
Books shelved snugly?
Shelving 4-6 inches off floor?
Stairways and pipe shafts enclosed?
No valuable materials in basement?
Exits unobstructed?
Important collections away from windows?

	Acceptable (Yes/No)	Action Required	Completed
12. Housekeeping			
Safe storage of cleaning supplies and other flammables?			
Trash removed nightly?			
Staff room cleaned daily and well?			
Smoking prohibited?			
Food and drink prohibition enforced?			
Pest management strategies in place?			
13. Security			
Book drops outside building or in fire-resistant room?			
Exterior lighting of building?			
Locks/alarms on windows and doors?			
Intrusion alarms/detectors?			
Effective closing procedures?			
14. Insurance			
Policy up to date?			
"Acts of God" covered?			
Replacement costs specified for special materials?			
New equipment added to policy?			
Staff aware of records required for claim, and those records maintained?			
Duplicate shelflist and/or catalog?			
Staff aware of procedures for claiming federal disaster relief?			
15. Construction projects			
Responsibility for enforcement of fire safety precautions specified in contract?			
Fire guards used in all cutting and welding operations?			
Debris removed daily?			
Fire-resistant partitions used to separate building areas?			
Extra fire extinguishers on hand?			